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Hayden C. Holliman

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# The Consolidated Audit Trail: An Overreaction to the Danger of Flash Crashes from High Frequency Trading

## I. INTRODUCTION

On May 6, 2010, \$1 trillion of securities' market value dissipated in less than thirty minutes.<sup>1</sup> The rapid decline of market value is now known as the "Flash Crash."<sup>2</sup> During the Flash Crash, some blue-chip stocks such as Proctor & Gamble lost 36% of their value,<sup>3</sup> while other stocks like Accenture lost 99% of their value.<sup>4</sup> In just twenty minutes on the afternoon of the Flash Crash, stock exchanges processed 20,000 trades, spanning more than 300 securities, which traded at a price 60% higher or lower than the securities' prices earlier that afternoon.<sup>5</sup> High Frequency Trading ("HFT")<sup>6</sup> received the majority of the blame for the extreme loss of market value.<sup>7</sup> The Flash Crash began when a HFT hedge fund,<sup>8</sup> using an incorrectly inputted

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1. Tom C.W. Lin, *The New Investor*, 60 UCLA L.REV. 678, 704 (2013).

2. *Id.*; Charles R. Korsmo, *High-Frequency Trading: A Regulatory Strategy*, 48 U. RICH. L. REV. 523, 527 (2014).

3. Korsmo, *supra* note 2, at 525.

4. Henry T.C. Hu, *Too Complex to Depict? Innovation, "Pure Information," and the SEC Disclosure Paradigm*, 90 TEX. L.REV. 1601, 1703 (2012).

5. *Id.*

6. HFT funds buy or sell securities at speeds not obtainable by humans because of the use of algorithms that allow the HFT funds to react to market news before humans can decide whether to buy or sell. See Matthew O'Brien, *High Speed Trading Isn't About Efficiency—It's About Cheating*, THE ATLANTIC (Feb. 8, 2014, 9:00 AM), [http://www.theatlantic.com/business/archive/2014/02/high-speed-trading-isnt-about-efficiency-its-about-cheating/283677/?single\\_page=true](http://www.theatlantic.com/business/archive/2014/02/high-speed-trading-isnt-about-efficiency-its-about-cheating/283677/?single_page=true).

7. See REPORT OF THE STAFFS OF THE CFTC AND SEC TO THE JOINT ADVISORY COMMITTEE ON EMERGING REGULATORY ISSUES, FINDINGS REGARDING THE MARKET EVENTS OF MAY 6, 2010, at 2–3 (2010) [hereinafter REPORT], available at <http://www.sec.gov/news/studies/2010/marketevents-report.pdf> (describing how the improper execution of a sell algorithm was a direct cause of the Flash Crash).

8. A HFT hedge fund operates much like a normal hedge fund, except its primary way to derive income is from the use of complex algorithms that operate at speeds not attainable by other investors. See Katherine Burton, *Citadel Fund Said to Quadruple with High-Frequency Trades*, BLOOMBERG (April 11, 2014), <http://www.bloomberg.com/news/2014-04-11/citadel-fund-said-to-quadruple-with-high-frequency-trades.html> (explaining that Citadel LLC is a hedge fund that started as a high frequency strategy fund).

algorithm, executed a multi-billion dollar trade in mere minutes that would normally take hours.<sup>9</sup> The trade produced a domino effect of HFT funds instantaneously selling large blocks of the same securities to each other,<sup>10</sup> resulting in the Dow Jones Industrial Average (“Dow”) dropping 9.16% at the height of the Flash Crash.<sup>11</sup>

Similarly, during the “Black Monday” crash of October 19, 1987, the markets fell more than 20% and did not fully recover for almost two years.<sup>12</sup> Unlike the Black Monday crash, the markets during the Flash Crash recovered most of the trillion-dollar loss in minutes.<sup>13</sup> Four years later, however, investors still fear another flash crash and the resulting harm.<sup>14</sup> Fortunately, the Securities Exchange Commission (“SEC”) has promulgated regulations that provide increased surveillance of the markets and more effective control over severe market disruptions like the Flash Crash.<sup>15</sup>

On August 1, 2012, the SEC promulgated Rule 613 mandating the eighteen<sup>16</sup> Self-Regulatory Organizations (“SROs”)<sup>17</sup> and the

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9. REPORT, *supra* note 7, at 1–2.

10. *Id.* at 3.

11. Lin, *supra* note 1, at 704; Korsmo, *supra* note 2, at 527.

12. Korsmo, *supra* note 2, at 527.

13. *Id.*

14. Steven Russolillo, *Flash Crash, Four Years Later, Still Haunts Wall Street*, WALL ST. J. MONEYBEAT (May 6, 2014, 11:01 AM), <http://blogs.wsj.com/moneybeat/2014/05/06/flash-crash-four-years-later-still-haunts-wall-street/>.

15. Consolidated Audit Trail, 77 Fed. Reg. 45722, 45723 (Aug. 1, 2012) (codified at 17 C.F.R. pt. 242).

16. The SROs consist of the BATS BYX Exchange, BATS BZX Exchange, BOX Options Exchange, C2 Options Exchange, Chicago Board Options Exchange, Chicago Stock Exchange, EDGA Exchange, EDGX Exchange, International Securities Exchange, ISE Gemini, MIAX Options Exchange, Nasdaq OMX BX, Nasdaq OMX PHLX, National Stock Exchange, New York Stock Exchange, NYSE Arca, NYSE MKT, and the Nasdaq Stock Market. *CAT NMS Plan Participants*, <http://catnmsplan.com/> (last visited Jan. 3, 2015).

17. Securities industry SROs “existed before federal securities laws were enacted in 1933 and 1934” as “private sector membership organizations of securities industry professionals.” Roberta S. Karmel, *Should Securities Industry Self-Regulatory Organizations Be Considered Government Agencies?*, 14 STAN. J.L. BUS. & FIN. 151, 151 (2008). “They set standards of conduct for their members and disciplined errant members.” *Id.* In recent history, SROs “have become integrated into the scheme of federal statutory regulation” and the SEC now has “oversight of all their activities.” *Id.* They still, however, play a role in controlling the national exchanges notwithstanding SEC oversight. *See* Order Approving, on a Pilot Basis, the National Market System Plan To Address Extraordinary Market Volatility, 77 Fed. Reg. 33498, 33500 (June 6, 2012) (showing that the SROs submitted the Plan that the SEC then adopted).

Financial Industry Regulatory Authority (“FINRA”)<sup>18</sup> to jointly submit a National Market System (“NMS”) plan, which requires them to create and implement a Consolidated Audit Trail (“CAT”).<sup>19</sup> Congress developed the NMS in 1975 in order to ensure a readily accessible, efficient, and fair market place.<sup>20</sup> Rule 613 aims to further the goals of the NMS by giving regulators more effective control and surveillance of the markets in a time of increased electronic trading.<sup>21</sup> Rule 613 also allows regulators to track all NMS security<sup>22</sup> activity in an efficient and accurate manner.<sup>23</sup> The rule mandates that each national security exchange and FINRA provide detailed information—including origination, modification, cancellation, routing, and execution—on every quote, order, and trade across all NMS exchanges.<sup>24</sup> Every quote, order, and trade must be reported into a central repository by the next trading day in order for the SEC and the SROs to monitor and analyze

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18. FINRA is an independent non-profit organization dedicated to investor protection and efficient regulation of the securities industry. *About FINRA*, FIN. INDUSTRY REG. AUTHORITY, <http://www.finra.org/AboutFINRA/> (last visited Jan. 6, 2015). Congress authorized FINRA to protect investors and FINRA does so by writing and enforcing rules governing the activities of over 4,100 securities firms with approximately 640,000 brokers. *Id.* Furthermore, FINRA is a “private nonprofit funded from fees from the exchanges as well as from the Wall Street brokerages it regulates.” Silla Brush & Matthew Phillips, *An SEC Computer to Peer into Wall Street’s Dark Pools*, BLOOMBERG BUS. WK., Aug. 11, 2014, at 28–29.

19. Consolidated Audit Trail, 77 Fed. Reg. at 45723.

20. See Mark Borrelli, *Market Making in the Electronic Age*, 32 LOY. U. CHI. L.J. 815, 834 (2001) (explaining that Congress developed the NMS out of a desire for efficient execution of transactions, fair competition between exchanges and markets, readily available quotes, the ability to execute orders in the best market, and so investors could execute orders without the participation of a dealer).

21. Press Release, U.S. Sec. & Exch. Comm’n, SEC Proposes Consolidated Audit Trail System to Better Track Market Trades (May 26, 2010), <http://www.sec.gov/news/press/2010/2010-86.htm>.

22. A NMS security is “any security or class of securities for which transaction reports are collected, processed, and made available pursuant to an effective transaction reporting plan, or an effective national market system plan for reporting transaction in listed options.” 17 C.F.R. § 242.600(b)(46) (2014). “In general the term NMS security refers to exchange-listed equity securities and standardized options, but does not include exchange-listed debt securities, securities futures, or open-end mutual funds, which are not currently reported pursuant to an effective transaction reporting plan.” *Responses to Frequently Asked Questions Concerning Large Trader Reporting*, U.S. SEC. & EXCH. COMM’N, <http://www.sec.gov/divisions/marketreg/large-trader-faqs.htm> (last visited Jan. 7, 2015) (internal quotation marks omitted).

23. *Fact Sheet: Creating a Consolidated Audit Trail*, U.S. SEC. & EXCH. COMM’N (July 11, 2012), [http://www.sec.gov/News/Article/Detail/Article/1365171492567#U\\_Xq\\_M9MvX4](http://www.sec.gov/News/Article/Detail/Article/1365171492567#U_Xq_M9MvX4) (last visited Feb. 11, 2015) [hereinafter *Fact Sheet*].

24. *Id.*

the markets.<sup>25</sup>

The rise of HFT and the subsequent Flash Crash also forced the SEC to adopt additional regulations to combat flash crashes.<sup>26</sup> These regulations such as the limit-up-limit-down mechanism, erroneous trade rules, market access regulations, and large trader reporting rules substantially limit the possibility future flash crashes.<sup>27</sup> Regardless of the financial costs<sup>28</sup> and immense data privacy concerns,<sup>29</sup> the SEC promulgated Rule 613.<sup>30</sup> For instance, the CAT will record over 50 billion daily transactions and monitor over 100 million customer accounts, making it the largest transaction securities database in the world.<sup>31</sup> On September 30, 2014, the SROs and FINRA submitted the NMS plan,<sup>32</sup> which estimates an average total five year cost of \$255 million.<sup>33</sup>

The NMS plan provides an iteration of the CAT—while cost friendly relative to initial estimates<sup>34</sup>—that is neither substantially effective, nor necessary in light of previous efforts to combat flash crashes. This Note discusses HFT, its potential dangers and effects, and the regulations attempting to control the dangers and effects. Additionally, the Note analyzes the CATs goals, potential problems, and costs. Part II provides an overview of HFT, how it affects the market landscape, and its function and goals.<sup>35</sup> Part III examines the

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25. *Id.*

26. See Ken Sweet, 'Flash Crash' Worries Go Global, CNN MONEY (May 6, 2011, 11:09 AM), [http://money.cnn.com/2011/05/06/markets/flash\\_crash/index.htm](http://money.cnn.com/2011/05/06/markets/flash_crash/index.htm).

27. See *infra* Part IV.A–D.

28. *CAT Cost Estimates Vary, Sit Well Below 2010 Figure*, 46 Sec. Reg. & L. Rep. (BNA) No. 39, at 1948, 1948 (Oct. 6, 2014) (estimating the CAT to cost over \$500 million over its first five years of implementation).

29. See Yin Vilczek, *SEC Adopts Rule for Consolidated Audit Trail; Dissenters Object to Change From Proposal*, 44 Sec. Reg. & L. Rep. (BNA) No. 29, at 1359 (July 16, 2012) (offering an overview of the amount of data that must be reported to the central repository of the CAT).

30. Consolidated Audit Trail, 77 Fed. Reg. 45722, 45723 (Aug. 1, 2012) (codified at 17 C.F.R. pt. 242).

31. *CAT Cost Estimates Vary, Sit Well Below 2010 Figure*, *supra* note 28.

32. Letter from the Parties to the National Market System Plan Governing the Consolidated Audit Trail to Brent J. Fields, Sec'y, U.S. Sec. & Exch. Comm'n 1 (Sept. 30, 2014) [hereinafter Joint NMS Plan Letter], available at <http://catnmsplan.com/web/groups/catnms/@catnms/documents/appsupportdocs/p600989.pdf>.

33. *Id.*

34. *CAT Cost Estimates Vary, Sit Well Below 2010 Figure*, *supra* note 28.

35. See *infra* Part II.

causes and repercussions of the Flash Crash.<sup>36</sup> Part IV analyzes SEC regulations concerning market control, how they function, why they are important to prevent extreme market volatility, and the effectiveness of each regulation.<sup>37</sup> Part V examines the purpose and need for the NMS Plan, why the adopted iteration of the CAT is ineffective, and conflicts of interest arising from Rule 613.<sup>38</sup> Part VI discusses the potential costs of the CAT, specifically the actual financial costs and potential privacy costs.<sup>39</sup> Lastly, Part VII summarizes why the CAT is an overreaction to the dangers of flash crashes.<sup>40</sup>

## II. UNDERSTANDING HIGH FREQUENCY TRADING

The switch from pen and paper to computer and keyboard in the digital world produced the need for HFT.<sup>41</sup> While the advent of HFT<sup>42</sup> is inconclusive, some familiar with HFT suggested it originated around 1999.<sup>43</sup> Since 1999, traders yelling out bids and asks on the trading floor actually represent few, if any, trades.<sup>44</sup> Instead, HFT funds make a

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36. See *infra* Part III.

37. See *infra* Part IV.

38. See *infra* Part V.

39. See *infra* Part VI.

40. See *infra* Part VII.

41. Michael J. McGowan, *The Rise of Computerized High Frequency Trading: Use and Controversy*, 2010 DUKE L. & TECH. REV. 16, ¶ 1 (Nov. 8, 2010).

42. A literature review released by the SEC identified five characteristics that are often attributed to HFT:

1. Use of Extraordinarily high speed and sophisticated programs for generating, routing, and executing orders.
2. Use of co-location services and individuals data feeds offered by exchanges and others to minimize network and other latencies.
3. Very-short time-frames for establishing and liquidating positions.
4. Submission of numerous orders that are cancelled shortly after submission.
5. Ending the trading day in as close to a flat position as possible.

STAFF OF THE DIV. OF TRADING AND MKTS., U.S. SEC. & EXCH. COMM'N, EQUITY MARKET STRUCTURE LITERATURE REVIEW: PART II: HIGH FREQUENCY TRADING 4 (Mar. 18, 2014) [hereinafter EQUITY MARKET STRUCTURE], available at [http://www.sec.gov/marketstructure/research/hft\\_lit\\_review\\_march\\_2014.pdf](http://www.sec.gov/marketstructure/research/hft_lit_review_march_2014.pdf).

43. Jonathan A. Brogaard, *High Frequency Trading and Its Impact on Market Quality* 5 (July 6, 2010) (unpublished thesis, Northwestern University), available at [http://www.futuresindustry.org/ptg/downloads/HFT\\_Trading.pdf](http://www.futuresindustry.org/ptg/downloads/HFT_Trading.pdf).

44. McGowan, *supra* note 41, ¶ 1.

majority of trades.<sup>45</sup> HFT funds can operate as part of a large hedge fund with many different income streams, or funds that derive income only from HFT.<sup>46</sup> “HFT is one of the most significant market structure developments in recent years” and impacts an overwhelming majority of the market’s performance.<sup>47</sup> Algorithmic trading<sup>48</sup> is the heart of HFT, and these algorithms continually evolve in both complexity and speed.<sup>49</sup>

HFT funds differ from the average investor because they use computers and algorithms to trade at speeds and intelligences not attainable by humans.<sup>50</sup> The incredible speeds at which HFT funds trade (milliseconds or less) result in increased profits because of the infinitesimal distortions among prices across exchanges.<sup>51</sup> Using computer derived algorithms, HFT funds profit by moving in and out of positions at faster rates than the average investor.<sup>52</sup> HFT funds can also determine market distortions more quickly and more efficiently than the average investor.<sup>53</sup> For example, large mutual fund A executes a trade to sell two million shares of Apple.<sup>54</sup> The trade induces a momentary dip in the price of Apple stock because the market is now saturated with two million more shares of Apple stock.<sup>55</sup> The HFT funds’ algorithms instantaneously execute a trade to buy<sup>56</sup> Apple stock during the brief decline in price and proceed to sell it shortly thereafter at the normal

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45. See EQUITY MARKET STRUCTURE, *supra* note 42, at 4 (“While not a vast majority, most estimates suggest that HFT contribute to at least 50% of trades executed.”).

46. Burton, *supra* note 8.

47. *Id.*

48. “A group of researchers has identified the following helpful common characteristics of algorithmic trading as (1) the use of pre-designed trading decisions; (2) implementation by professional traders; (3) automated observation of market data in real time; (4) automated order submission; (5) automated order management; (6) lack of pre-trade human intervention; and (7) use of direct market access (in other words, the trader’s computer interfaces directly with the exchange’s computerized trading system).” Korsmo, *supra* note 2, at 538–39 (internal quotation marks omitted).

49. See McGowan, *supra* note 41, ¶ 2.

50. *Id.* ¶¶ 2–3.

51. *Id.* ¶ 15.

52. *Id.*

53. *Id.* ¶¶ 15–16.

54. See Bill Conerly, *High Frequency Trading Explained Simply*, FORBES (Apr. 4, 2011, 2:09 PM), <http://www.forbes.com/sites/billconerly/2014/04/14/high-frequency-trading-explained-simply/>.

55. *Id.*

56. HFT funds also do the inverse and short sell stocks, when they detect a stock rising in price that will drop in price shortly thereafter. *Id.*

price.<sup>57</sup>

Simply detecting the dip in stock price more quickly than the average investor, however, does not guarantee the HFT fund will profit.<sup>58</sup> The HFT fund must distinguish between short blips in prices and overall trends in the market because the former results in profits for the HFT fund, while the latter may not.<sup>59</sup> The difficulty of distinguishing between a blip and a trend requires more effective and complex algorithms.<sup>60</sup> Even with HFT profits declining since their peak in 2009, HFT still constitutes a majority of trades in the United States and, therefore, substantially impacts U.S. securities' markets.<sup>61</sup>

### III. THE FLASH CRASH OF MAY 6, 2010

The SEC blamed the Flash Crash on HFT, notwithstanding the negative financial landscape leading up to the Flash Crash on the morning of May 6, 2010.<sup>62</sup> Negative political and economic news concerning the European debt crisis loomed large,<sup>63</sup> leading market participants to increase their aversion to risk.<sup>64</sup> For instance, gold futures rose 2.5% as investors engaged in a "flight to quality."<sup>65</sup> Even after acknowledging heightened conditions for market volatility, however, the SEC and the Commodity Futures Trading Commission ("CFTC") determined, after four months of analyzing and examining trading data from the day of the Flash Crash, that HFT substantially caused the Flash Crash.<sup>66</sup>

The first domino falling on the day of the Flash Crash occurred

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57. *Id.*

58. *Id.*

59. *Id.*

60. *Id.*

61. *Id.* at 542.

62. See REPORT, *supra* note 7, at 1–3 (explaining the backdrop of a volatile market, yet describing how a HFT fund's improperly executed order led to extreme volatility).

63. *Id.* at 1.

64. See *id.* at 9.

65. *Id.* Because of its status as a safe investment, buying gold is considered a "flight to quality." See Frank Tang & Clara Denina, *PRECIOUS—Gold Rises to 2-Week High as Equities Slide on Growth*, REUTERS (Oct. 9, 2014, 2:38 PM), <http://www.reuters.com/article/2014/10/09/markets-precious-idUSL3N0S42TN20141009> (stating that when market participants lose faith in equities they sometimes start investing more heavily in relatively safe investments, such as gold).

66. See REPORT, *supra* note 7, at 2–5 (detailing how the HFT fund's improperly inputted algorithm started a chain reaction which lead to the substantial market loss).



when a HFT fund in Kansas (“Waddell & Reed”)<sup>67</sup> initiated a trade to sell 75,000 E-Mini<sup>68</sup> contracts, valued at \$4.1 billion.<sup>69</sup> Waddell & Reed designed the trade to execute sell orders of June 2010 E-Mini contracts until it reached a pre-calculated point of volume.<sup>70</sup> Waddell & Reed, however, neglected to program the algorithm to include price or time as part of the inputs.<sup>71</sup> Because of the improper inputs, the algorithm executed the trade in only twenty minutes, whereas a comparable trade of similar size normally takes days to execute.<sup>72</sup> By comparison, Waddell & Reed previously placed an identical-sized order that took over five hours to execute because the algorithm included time and price as inputs.<sup>73</sup>

Shortly after Waddell & Reed executed the trade, other HFT funds reacted by buying E-Mini futures because their algorithms predicted E-Mini futures returning to normal levels.<sup>74</sup> As other HFT funds commenced trading E-Mini futures, however, Waddell & Reed’s faulty algorithm proceeded to fill its original order even faster because of the increased volume, without regard to price.<sup>75</sup> A combination of the pressure from Waddell & Reed’s algorithm and other HFT funds reacting to Waddell & Reed’s trading resulted in the price of E-Mini futures declining by 3% in four minutes.<sup>76</sup> Shortly thereafter, the HFT funds rapidly bought and then resold contracts among each other, resulting in the same position passing back and forth.<sup>77</sup>

The Dow had not witnessed such volatility and loss of value in

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67. Marcy Gordon & Daniel Wagner, ‘Flash Crash Report: Waddell & Reed Blamed for Market Plunge’, HUFFINGTON POST BUS. (Dec. 1, 2010, 5:12 AM), [http://www.huffingtonpost.com/2010/10/01/flash-crash-report-one-41\\_n\\_747215.html](http://www.huffingtonpost.com/2010/10/01/flash-crash-report-one-41_n_747215.html).

68. The E-Mini is “designed to track stocks in the S&P 500 Index.” REPORT, *supra* note 7, at 10; see Korsmo, *supra* note 2, at 568 n. 219 (“The holder of an E-Mini contract is entitled to a payment of 50 times the value of the S&P 500 index at the time the contract expires. The E-Mini is one of the most widely traded stock market index futures contract, allowing both speculation and hedging of other positions.”).

69. REPORT, *supra* note 7, at 2; Lin, *supra* note 1, at 704.

70. REPORT, *supra* note 7, at 2.

71. *Id.*

72. *Id.*

73. *Id.*

74. Lin, *supra* note 1, at 704.

75. REPORT, *supra* note 7, at 3–4.

76. *Id.* at 15.

77. See *id.* at 3 (stating that in twelve seconds HFT funds traded over 27,000 contracts, 49% of the total volume, but only bought an additional 200 contracts).

such a short period of time since Black Monday<sup>78</sup> in 1987.<sup>79</sup> Many of the other 8,000 individual equity securities and exchange traded funds (“ETFs”)<sup>80</sup> suffered price declines of up to 15%, but recovered most of their loss by the end of the trading day.<sup>81</sup> Some stocks traded for a penny or less and then quickly returned to their pre-crash levels.<sup>82</sup> Stocks such as Apple and Sothebys traded at \$100,000, when they opened the day around \$250<sup>83</sup> and \$34,<sup>84</sup> respectively, only to return to opening day prices shortly thereafter.<sup>85</sup> In whole, \$1 trillion worth of securities’ market value dissipated in thirty minutes.<sup>86</sup>

Days of extreme volatility similar to the Flash Crash must be avoided because they detrimentally impact investors’ confidence in the market.<sup>87</sup> Equity markets were envisioned as a place where individual investors could use their capital to invest in growing companies.<sup>88</sup> Individual investment also lowers the cost of capital for companies and increase the rate of return for investors, thereby benefiting both investors and companies.<sup>89</sup> The ability of one HFT fund to commence a string of actions pushing a \$30 stock to a penny, however, gives the individual investor “little incentive to risk their capital.”<sup>90</sup>

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78. Financial analysts determined that commodity futures trading was the leading precipitating factor of the market crash in 1987. See Jerry W. Markham & Rita McCloy Stephanz, *The Stock Market Crash of 1987—The United States Looks at New Recommendations*, 76 GEO. L.J. 993, 998–99 (1988). Specifically, the use of futures to hedge, resulting in pseudo “portfolio insurance”, was cited as a reason for the crash. *Id.*

79. Korsmo, *supra* note 2, at 526.

80. ETF’s are similar to mutual funds in that they are both pools of investments, but while an ETF’s price changes throughout the trading day, a mutual fund’s price is set at the end of each trading day. Michael Chamberlain, *What’s the Difference? Mutual Funds and Exchange Traded Funds Explained*, FORBES (July 18, 2013, 12:20 PM), <http://www.forbes.com/sites/feeonlyplanner/2013/07/18/whats-the-difference-mutual-funds-and-exchange-traded-funds-explained/>. For example, during trading days an ETF has a continuous bid and ask price, while the price of the mutual fund for the trading day is the price determined at the end of the previous trading day. *Id.* Furthermore, the operating expenses of ETFs are less than a mutual fund, and they are treated different for tax purposes. *Id.*

81. REPORT, *supra* note 7, at 1.

82. *Id.*

83. Korsmo, *supra* note 2, at 527.

84. Lin, *supra* note 1, at 704.

85. *Id.*; see Korsmo, *supra* note 2, at 526–27.

86. Korsmo, *supra* note 2, at 526.

87. Andrew J. Keller, *Robocops: Regulating High Frequency Trading After the Flash Crash of 2010*, 73 OHIO ST. L.J. 1457, 1476(2012).

88. *Id.*

89. *Id.*

90. *Id.* at 1474.

## IV. REGULATIONS PROMULGATED IN RESPONSE TO THE FLASH CRASH

In order to prevent another Flash Crash, the SEC responded with regulations addressing market volatility mechanisms, clearly erroneous trade protection, risk management for broker-dealers, and large trader reporting requirements.<sup>91</sup> All of the regulations that the SEC promulgated work in conjunction with each other to more thoroughly and effectively regulate the market to prevent flash crashes.<sup>92</sup> Additionally, even the large trader reporting requirement, rendered somewhat redundant by the CAT, continues to exist after the implementation of the CAT.<sup>93</sup> If the regulations prove as effective as intended, however, the need for the CAT to help prevent flash crashes becomes considerably diminished.

A. *Market Volatility Mechanisms: Market-Wide Circuit Breakers, Single-Stock Circuit Breakers, and Limit Up-Limit Down Mechanism*

On June 10, 2010, barely a month after the Flash Crash, the SEC approved new rules on a pilot basis<sup>94</sup> that expanded circuit breaker regulations.<sup>95</sup> Market circuit breakers pause all trading activity if the “benchmark index”<sup>96</sup> that the circuit breakers are tied to decreases to a set percentage relative to the previous trading day.<sup>97</sup> The New York Stock Exchange (“NYSE”) instituted market circuit breakers in October

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91. *Fact Sheet*, *supra* note 23.

92. *See id.*

93. Consolidated Audit Trail, 77 Fed. Reg. 45722, 45733–34 (Aug. 1, 2012) (codified at 17 C.F.R. pt. 242).

94. The U.S. exchanges and FINRA proposed the rules in response to the Flash Crash. *See Investor Bulletin: New Stock by Stock Circuit Breakers*, U.S. SEC. & EXCH. COMM’N, <http://www.sec.gov/investor/alerts/circuitbreakers.htm> (last visited Jan. 3, 2015) [hereinafter *Investor Bulletin*].

95. *Id.*

96. The Dow was the benchmark index for the original market circuit breakers. *NYSE Market Model: Circuit Breakers*, NYSE, <https://www.nyse.com/markets/nyse/market-model> (last visited Jan. 6, 2015).

97. *Testimony Concerning the Severe Market Disruption on May 6, 2010, Before the H. Subcomm. on Capital Mkts.*, 111th Cong. 11–12 (2010) [hereinafter *Shapiro Testimony*] (statement of Mary L. Shapiro, Chair, U.S. Sec. & Exch. Comm’n) (stating that at its lowest decline from the previous day close the Dow had declined 9.16%, which was not enough to trigger the 10% market circuit breakers).

1989, following the Black Monday<sup>98</sup> crash in October 1987, in order to “reduce volatility and promote investor confidence.”<sup>99</sup> The pause in trading offers an investor time to decipher information surrounding the decline, and make informed decisions regarding high market volatility.<sup>100</sup> The NYSE last updated the original market circuit breakers in 1998.<sup>101</sup> The original market circuit breakers paused trading for a set duration if the Dow declined 10%, 20%, or 30%, compared to the previous close of the Dow.<sup>102</sup> These market circuit breakers were in effect during the Flash Crash, but failed to trigger because the Dow did not fall below the 10% threshold.<sup>103</sup> In response to the Flash Crash not triggering the existing market circuit breakers, the SEC moved swiftly to approve rules to expand the circuit breaker program.<sup>104</sup>

Citing “disparate trading rules and conventions across the exchanges,” as a basis for the Flash Crash, then SEC Chairwoman Mary Shapiro deemed uniform circuit breakers of great importance to combat future times of high market volatility.<sup>105</sup> Shapiro explained that “[single stock circuit breakers] across exchanges would limit volatility” and would “increase market transparency, [and] bolster investor protection.”<sup>106</sup> The new single stock circuit breaker rules instituted a “uniform market-wide pause in trading in individual stocks whose price moves 10% or more in a five-minute period.”<sup>107</sup> The five-minute pause gives the markets an opportunity to “establish a reasonable market price[]” and “resume trading in a fair and orderly fashion.”<sup>108</sup> The SEC implemented single stock circuit breakers in three phases, culminating in all NMS securities being subjected to single stock circuit breaker

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98. On October 19, 1987, the market fell 22.6% and lost \$500 billion in one day. Mark Koba, *Market Circuit Breakers: CNBC Explains*, CNBC.COM (Aug. 10, 2011), <http://www.cnbc.com/id/44059883#>.

99. *Id.*

100. *Id.*

101. *Shapiro Testimony*, *supra* note 97, at 11.

102. *Id.* at 1.

103. *Id.* at 2.

104. *See Investor Bulletin*, *supra* note 94.

105. Press Release, U.S. Sec. & Exch. Comm’n, SEC to Publish for Public Comment Stock-by Stock Circuit Breaker Rule Proposals (June 30, 2010), <http://www.sec.gov/news/press/2010/2010-117.htm>.

106. *Id.*

107. *See Investor Bulletin*, *supra* note 94.

108. Press Release, U.S. Sec. & Exch. Comm’n, SEC Approves Rules Expanding Stock-by Stock Circuit Breakers and Clarifying Process for Breaking Erroneous Trades (Sept. 10, 2010), <http://www.sec.gov/news/press/2010/2010-167.htm>.

rules.<sup>109</sup> While swift action was taken after the Flash Crash, the SEC only applied single stock circuit breaker rules on a pilot basis and ultimately replaced them in 2012 when the SEC adopted new proposals to curb market volatility.<sup>110</sup>

On May 31, 2012, the SEC adopted two proposals, overhauling how exchanges dealt with flash crashes.<sup>111</sup> The first proposal updated market wide circuit breakers.<sup>112</sup> The second proposal, the “limit up-limit-down” mechanism, replaced the existing single stock circuit breakers that expired on July 31, 2012.<sup>113</sup> The new market wide circuit breaker rules decreased the thresholds that trigger a trading pause to 7%, 13%, and 20% from 10%, 20%, and 30%, respectively.<sup>114</sup> Additionally, the SEC will calculate the triggering values daily, and the S&P 500 replaced the Dow as the reference index used to calculate the trigger points of a trading halt.<sup>115</sup>

The second proposal established a limit up-limit down mechanism.<sup>116</sup> The limit up-limit down mechanism “intend[s] to reduce the negative impacts of sudden unanticipated price movements” similar to those that happened during the Flash Crash.<sup>117</sup> The mechanism establishes price bands,<sup>118</sup> and if an individual NMS stock moves outside of its price band for more than fifteen seconds, the exchanges pause trading on the stock for five minutes.<sup>119</sup> The plan established different tiers of securities resulting in different price bands for different

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109. See *Investor Bulletin*, *supra* note 94 (providing that phase one subjected stocks listed on the S&P 500 to the rules, phase two subjected securities listed on the Russell 2000 and Exchange Traded funds to the rules, and phase three subjected all NMS securities to the rules).

110. See Press Release, U.S. Sec. & Exch. Comm’n, *supra* note 108.

111. Press Release, U.S. Sec. & Exch. Comm’n, SEC Approves Proposals to Address Extraordinary Volatility in Individual Stocks and Broader Stock Market (June 1, 2012), <http://www.sec.gov/News/PressRelease/Detail/PressRelease/1365171482422#.VNBTO4fxTFI>.

112. *Id.*

113. Order Approving, on a Pilot Basis, the National Market System Plan To Address Extraordinary Market Volatility 77 Fed. Reg. 33498, 33500 (June 6, 2012).

114. Press Release, U.S. Sec. & Exch. Comm’n, *supra* note 111.

115. *Id.*

116. *Id.*

117. Order Approving, on a Pilot Basis, the National Market System Plan To Address Extraordinary Market Volatility, 77 Fed. Reg. at 33501.

118. The upper and lower price bands are based on a reference price which is the mean price of reported transactions for the NMS stock over the preceding five minute period. *Id.*

119. Order Approving, on a Pilot Basis, the National Market System Plan To Address Extraordinary Market Volatility, 77 Fed. Reg. at 33501.

securities.<sup>120</sup> For example, Tier 1 NMS securities—securities in the S&P 500 Index, Russell 1000 Index, and certain ETFs—with a price of more than \$3 use a 5% percentage parameter, instead of the previous 10% parameter.<sup>121</sup> Tier 2<sup>122</sup> NMS Stocks with a price greater than \$3 use a 10% percentage parameter, instead of the previous 20% parameter.<sup>123</sup>

*B. Clearly Erroneous Trades*

On September 16, 2010, the SEC adopted new rules regulating clearly erroneous trades.<sup>124</sup> During a twenty minute period on the day of the Flash Crash, exchanges processed many trades, in different securities, at prices differing 60% from their pre-Flash Crash level.<sup>125</sup> The National Security Exchanges, along with FINRA, invalidated all trades executed at levels 60% or more away from preceding levels under their erroneous trade execution authority.<sup>126</sup> This erroneous trade authority, however, could only be authorized during extraordinary market conditions.<sup>127</sup>

Yet, the exchanges did not have uniform rules on precisely how to determine if the trades were erroneous.<sup>128</sup> Some exchanges designate erroneous trades by calculating if the price of a stock exceeded a parameter percentage based on the preceding market price, while other exchanges give power to their officials to label trades erroneous.<sup>129</sup> The lack of transparency in determining the 60% figure to break trades could lead to confusion and uncertainty during a flash crash.<sup>130</sup> As a result, the SEC adopted uniform guidelines on breaking erroneous trades.<sup>131</sup>

The new rules on breaking erroneous trades provide a uniform

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120. *Id.*

121. *Id.* at 33514–15.

122. All stocks that are not Tier 1 NMS stocks. *Id.*

123. *Id.*

124. Order Granting Approval of Proposed Rule Changes Relating to Clearly Erroneous Transactions, 75 Fed. Reg. 56613 (Sept. 16, 2010).

125. REPORT *supra* note 7, at 1.

126. Order Granting Approval of Proposed Rule Changes Relating to Clearly Erroneous Transactions, 75 Fed. Reg. at 56614.

127. *Id.*

128. *Id.*

129. *Id.*

130. *Id.*

131. *Id.*

standard that reduces investor uncertainty about the determinations of erroneous trades.<sup>132</sup> Then SEC Chairwoman Shapiro stated, “Adopting consistent standards . . . will strengthen the resiliency of our markets . . . especially during periods of high market volatility.”<sup>133</sup> The clearly erroneous trade rules vest power in the exchange to break a trade if the price exceeded the consolidated last sale price by more than a specified percentage amount.<sup>134</sup> Stocks priced under twenty-five dollars must deviate at least 10% in order to be considered broken by exchanges.<sup>135</sup> Stocks priced between twenty-five and fifty dollars must deviate at least 5%, while stocks priced over fifty dollars must deviate at least 3%.<sup>136</sup> Further, erroneous trade review must commence within thirty minutes of the erroneous trade, and be resolved within thirty minutes of the start of the review.<sup>137</sup>

C. *Risk Management for Broker-Dealers with Market Access*

Because HFT compounds the impact of trading error, stringent pre-trade risk controls are necessary.<sup>138</sup> Moreover, the interconnectedness of the majority of financial markets allows trading errors to influence the whole market landscape.<sup>139</sup> On November 15, 2010, the SEC adopted rules prohibiting broker-dealers from granting “naked access” to an exchange and placing risk management controls on direct access given to customers.<sup>140</sup>

HFT funds with naked access submit orders directly to an exchange, bypassing the broker-dealer’s trading system.<sup>141</sup> Bypassing a broker-dealer’s trading system benefits HFT funds because it saves time and allows for “reduced latencies, and can facilitate more rapid trading.”<sup>142</sup> An HFT fund, using naked access without its own of risk

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132. Press Release, U.S Sec. & Exch. Comm’n, *supra* note 105.

133. *Id.*

134. Order Granting Approval of Proposed Rule Changes Relating to Clearly Erroneous Transactions, 75 Fed. Reg. at 56614–15.

135. *Id.*

136. *Id.*

137. *Id.*

138. Risk Management Controls for Brokers or Dealers With Market Access, 75 Fed. Reg. 69792 (Nov. 15, 2010) (codified at 17 C.F.R pt. 240).

139. *Id.* at 69794.

140. *Id.* at 69792–93.

141. *Id.* at 69822.

142. *Id.* at 69793.

control, can submit orders to an exchange without review for mistakes or miscalculations.<sup>143</sup> Shapiro likened “naked access” to “giving your car keys to a friend who doesn’t have a license and letting him drive unaccompanied.”<sup>144</sup>

Direct access orders do not bypass the broker-dealer’s trading system. However, before direct access regulation, the SEC had not implemented uniform risk control rules for broker-dealers.<sup>145</sup> For instance, some broker-dealers provided direct access without sufficient pre-trade risk resulting in the broker dealers offering HFT funds, in essence, naked access.<sup>146</sup> The adopted rule decreases the likelihood of broker-dealers executing faulty orders by instituting uniform risk control rules.<sup>147</sup>

Prohibiting naked access and putting risk controls on broker-dealers substantially diminishes the risks of an improperly executed order resulting in another flash crash.<sup>148</sup> For example, assume a buy algorithm placed orders at a rate of 1,000 per second and mistakenly placed repetitive 300-share orders, instead of one single 300-share order at a price of \$20 per share.<sup>149</sup> A two-minute delay in unearthing the improperly executed algorithm would allow the algorithm to execute 120,000 orders valued at \$720 million instead of one order valued at \$6,000.<sup>150</sup> However, the prohibition on “naked access” and institution of pre-trade risk controls, together, prevent this outcome by blocking the unintended orders from reaching the exchange.<sup>151</sup>

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143. *Id.* at 69794.

144. Press Release, U.S. Sec. & Exch. Comm’n, SEC Adopts New Rule Preventing Unfiltered Market Access (Nov. 3, 2010), <http://www.sec.gov/news/press/2010/2010-210.htm>.

145. *See* Risk Management Controls for Brokers or Dealers with Market Access, 75 Fed. Reg. at 69794.

146. *Id.*

147. *See id.* (“For example, a system-driven pre-trade control designed to reject orders that are not reasonably related to the quoted price of the security would prevent erroneously entered orders from reaching the securities markets . . .”).

148. *Id.*

149. *Id.*

150. *Id.* If 1,000 orders were placed every second, 120,000 orders could be placed in two minutes. Further, 120,000 orders consisting of 300 shares would result in 36 million shares purchased; 36 million shares valued at \$20 dollars share would be valued at \$720 million.

151. *Id.*



*D. Large Trader Reporting*

On August 3, 2011, the SEC adopted a large trader reporting rule requiring traders of a certain size to report trading data to the SEC.<sup>152</sup> While the SEC proposed the rule before the Flash Crash, the Flash Crash re-emphasized the importance of the SEC adopting a rule to “gather[] data on the most active market participants.”<sup>153</sup> There are two separate ways a trader qualifies as large trader.<sup>154</sup> First, a trader with an activity level greater than or equal to 2 million shares or any number of shares with a fair market value of \$20 million or greater on any calendar day qualifies as a large trader.<sup>155</sup> Second, a trader with an activity level greater than or equal to twenty million shares or any number of shares with a fair market value of \$200 million or greater during any calendar month qualifies as large trader.<sup>156</sup>

By attaching a unique identification number to each large trader, the rule “allow[s] the [SEC] to efficiently identify and analyze trading activity by the large trader.”<sup>157</sup> Furthermore, large traders must provide transaction data—including every order, cancellation of an order, and modification of an order—on every transaction made on the morning after the transaction.<sup>158</sup>

The large trader reporting rule provides the SEC with heightened oversight into the actions of large traders.<sup>159</sup> The rule also allows the SEC to “reconstruct market events, conduct investigations, and [execute] enforcement actions as appropriate.”<sup>160</sup> Because the CAT requires the same data as the large trader reporting rule from all broker-dealers, some members of the industry suggest the large trader reporting rule will become somewhat redundant when the CAT becomes fully effective.<sup>161</sup> Because the SEC believes the rule will complement the

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152. 17 C.F.R. § 240.13h-1 (2014).

153. Large Trader Reporting, 76 Fed. Reg. 46960 (Aug. 3, 2011) (codified at 17 C.F.R. pts. 240 & 249).

154. *Id.* at 46966 (quoting 17 C.F.R. § 240.13h-1(a)(7) (2014)).

155. *Id.*

156. *Id.*

157. Press Release, U.S. Sec. & Exch. Comm’n, SEC Adopts Large Trader Reporting Regime (July 26, 2011), <http://www.sec.gov/news/press/2011/2011-154.htm>.

158. *Id.*

159. *Id.*

160. *Id.* (quoting then Chairwoman Shapiro).

161. See Consolidated Audit Trail, 77 Fed. Reg. 45722, 45723 (Aug. 1, 2012) (codified at 17 C.F.R. pt. 242).

CAT and understands how long the SROs will need to fully implement the CAT, the SEC will not invalidate the rule.<sup>162</sup>

*E. Effectiveness of the Regulations*

Ultimately, no extreme market volatility followed the Flash Crash.<sup>163</sup> Industry experts, however, differ on whether the new regulations provided this long term stability.<sup>164</sup> For instance, a trader at Themis Trading suggested that a flash crash could happen at any time irrespective of the regulations.<sup>165</sup> Conversely, a spokesman from BATS exchange opined that the mechanisms in place make a flash crash “far less likely.”<sup>166</sup> Therefore, conclusively determining the effectiveness of these regulations is a difficult task because the exact set of circumstances present on May 6, 2010, are unlikely to repeat.<sup>167</sup> It is possible, however, to look at the regulations individually to evaluate how each would have impacted the Flash Crash.

First, during the height of the Flash Crash, the S&P 500’s decline of 8.6%<sup>168</sup> was insufficient to trigger the previous market circuit breakers.<sup>169</sup> The new post-Flash Crash market wide circuit breakers, however, pause trading at a 7% decline in the S&P 500.<sup>170</sup> Therefore, the 8.6% decline would have resulted in a market wide trading pause.<sup>171</sup> The trading pause would have allowed investors the time to make informed decisions about market conditions, thereby reducing market

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162. *See id.* at 45723–24.

163. Matt Krantz, *Four-year Flash Crash Anniversary Haunts Markets*, USA TODAY MONEY (May 5, 2014, 8:30 AM), <http://americasmarkets.usatoday.com/2014/05/05/four-year-flash-crash-anniversary-haunts-markets/>.

164. *Id.*

165. *Id.*

166. *Id.*

167. *See* Edgar Ortega Barrales, Note, *Lessons From the Flash Crash for the Regulation of High-Frequency Traders*, 17 FORDHAM J. CORP. & FIN. L. 1195, 1232–34 (2012) (indicating circumstances such as the Greece debt crisis also hovered over the stock market during the Flash Crash).

168. Matt Jarzemsky & Michael Driscoll, *New Circuit Breakers Would Have Halted Flash Crash*, WALL ST. J. BLOG (June 1, 2012, 5:27 PM), <http://blogs.wsj.com/marketbeat/2012/06/01/new-circuit-breakers-would-have-halted-flash-crash>.

169. The Dow did not fall the requisite 10% needed to halt trading. *See supra* notes 94–123 and accompanying text.

170. Jarzemsky & Driscoll, *supra* note 168.

171. *Id.*

volatility.<sup>172</sup>

Second, a study conducted by Yale researchers concluded that the limit up-limit down mechanism would have “adeptly halt[ed] stocks displaying up-down volatility,” if in place during the Flash Crash.<sup>173</sup> The study showed that the limit up-limit down mechanism would have paused trading in 60% of the 143 Russell 1000 stocks that experienced price changes beyond the 5% parameter.<sup>174</sup> Furthermore, the mechanism would have halted 80% of the tier 2 stocks—those not listed on the Russell 1000—that traded outside of the designated parameters.<sup>175</sup> For example, the limit up-limit down mechanism would have paused Apple trading because its price fell 60% between 2:40 p.m. and 3:00 p.m.<sup>176</sup> Overall, the limit up-limit down mechanism is effective, and would have limited the effects of the Flash Crash.

Third, while clearly erroneous trade regulation cannot directly prevent a flash crash, it can decrease the effects of a flash crash.<sup>177</sup> The regulations pertaining to clearly erroneous trades hope to boost investor confidence in the market during times of extreme market volatility, such as the Flash Crash.<sup>178</sup> While investor confidence proves difficult to measure, industry sentiment suggests the regulation does boost investor confidence.<sup>179</sup>

Fourth, the regulation on direct access focused substantially on preventing HFT funds from executing erroneous orders.<sup>180</sup> A HFT fund using an algorithm designed with incorrect inputs substantially caused the Flash Crash.<sup>181</sup> Because the direct access regulation provides safeguards on how HFT funds execute orders,<sup>182</sup> it undoubtedly decreases the rate of improperly executed orders reaching an

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172. *NYSE Market Model: Circuit Breakers*, *supra* note 96.

173. Bill Alpert & Lisa Stryjewski, *Hitting the Switch on New Circuit Breakers*, BARRON'S (Aug. 13, 2011), <http://online.barrons.com/news/articles/SB50001424052702304718904576486604254916420>.

174. *See id.*

175. *Id.*

176. Korsmo, *supra* note 2, at 528.

177. *See* Order Granting Approval of Proposed Rule Changes Relating to Clearly Erroneous Transactions, 75 Fed. Reg. 56613, 56614 (Sept. 16, 2010).

178. *Id.*

179. Alpert & Stryjewski, *supra* note 173.

180. Risk Management Controls for Brokers or Dealers with Market Access, 75 Fed. Reg. 69792, 69794 (Nov. 15, 2010).

181. REPORT, *supra* note 7, at 2.

182. *See id.*

exchange.<sup>183</sup> After the direct access regulation, a HFT fund must send an order to a broker-dealer with risk controls before the order reaches an exchange.<sup>184</sup> The broker-dealer's risk control could unearth the mistake in the algorithm and prevent a flash crash.<sup>185</sup>

Fifth, the large trader reporting rule creates a more transparent market.<sup>186</sup> The large trader reporting rule provides the SEC enhanced surveillance on the most active participants who are those able to most substantially affect the market.<sup>187</sup> The rule's lack of real time reporting limits the effectiveness in preventing a flash crash, yet effective surveillance over large traders leads to safer investment practices<sup>188</sup> by giving the SEC more effective methods to detect illegal and deceptive action.<sup>189</sup> On the whole, the regulations promulgated after the Flash Crash would have positive effects on either preventing the Flash Crash or limiting the Flash Crash once started. These regulations may also have successfully prevented many flash crashes since their enactment.

#### V. ANALYSIS OF THE NATIONAL MARKET SYSTEM PLAN TO CREATE A CONSOLIDATED AUDIT TRAIL

The SEC adopted Rule 613 to allow the SEC to efficiently and accurately track all activity throughout the U.S. markets in NMS securities.<sup>190</sup> The process of analyzing market events surrounding the Flash Crash lasted over four months.<sup>191</sup> The non-existence of any comprehensive audit trail contributed heavily to the slow process of analyzing the few hours of trading during the Flash Crash.<sup>192</sup> Before the

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183. See Risk Management Controls for Brokers or Dealers with Market Access, 75 Fed. Reg. at 69794 (describing how the risk control could prevent an improper order).

184. *Id.*

185. See *id.* (describing how the risk control could find mistakes in orders).

186. Press Release, U.S. Sec. & Exch. Comm'n, *supra* note 157.

187. *Id.*

188. *Id.*

189. See *id.*

190. Press Release, U.S. Sec. & Exch. Comm'n, SEC Approves New Rule Requiring Consolidated Audit Trail to Monitor and Analyze Trading Activity (July 11, 2012), <http://www.sec.gov/News/PressRelease/Detail/PressRelease/1365171483188#.VMmvPM9MvX4>.

191. See Nina Mehta, *Exchanges to Ask SEC to Delay Audit-Trail Deadline*, BLOOMBERG BUS. WK. (Dec. 3, 2013, 8:01 PM), <http://www.bloomberg.com/news/articles/2012-12-04/exchanges-to-ask-sec-to-delay-deadline-for-audit-trail-program>.

192. Consolidated Audit Trail, 77 Fed. Reg. 45722, 45723 (Aug. 1, 2012) (codified at 17 C.F.R. pt. 242).

implementation of Rule 613, the SROs and the SEC used a variety of data sources to “fulfill their regulatory obligation.”<sup>193</sup> For example, FINRA members follow the Order Audit Trail System<sup>194</sup> (“OATS”) rules and must record any “modification, cancellation or execution” of an order following transmission of the order to another FINRA member.<sup>195</sup> Other exchanges, such as options exchanges use the Consolidated Options Audit Trail System.<sup>196</sup>

The lack of a comprehensive audit trail, many different trading venues, and an immense amount of orders make it difficult for the SEC to oversee the U.S. securities markets.<sup>197</sup> Additionally, HFT, along with the Flash Crash, increased the urgency to enact Rule 613.<sup>198</sup> Understanding Rule 613 requires an understanding of the goals and purposes that the NMS plan seeks to achieve through the CAT.

While Rule 613 has several goals,<sup>199</sup> this Note specifically examines the goal of improved market surveillance and investigations.<sup>200</sup> Improved market surveillance and investigation decreases the chances of a flash crash by preventing the trades that precipitate a flash crash.<sup>201</sup> The CAT achieves these goals by requiring account holders to each have a unique ID, tracking the key events of an order, requiring comprehensive reporting of orders, and making all NMS securities subject to the CAT.<sup>202</sup> The goals, however, could be thwarted by the conflicts of interest Rule 613 creates.

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193. *Id.* at 45726.

194. FINRA describes OATS as an “integrated audit trail of order, quote, and trade information for all NMS stocks and OTC equity securities.” Order Audit Trail System (OATS), FINRA, <http://www.finra.org/Industry/Compliance/MarketTransparency/OATS/index.htm> (last visited Jan. 28, 2015). “FINRA uses this audit trail system to recreate events in the life cycle of orders and more completely monitor the trading practices of member firms.” *Id.*

195. Consolidated Audit Trail, 77 Fed. Reg. at 45723.

196. *Id.* at 45728.

197. *Id.* at 45726.

198. Herbert Lash, *Plan for U.S. Securities Audit Trail Seen Delayed Again*, REUTERS (Sept. 26, 2014, 5:53 PM), <http://www.reuters.com/article/2014/09/26/us-sec-flashcrash-delay-idUSKCN0HL27X20140926>.

199. Including analysis and reconstruction of the market during broad based events and general market analysis. Consolidated Audit Trail 77 Fed. Reg. at 45723.

200. *Id.*

201. *See id.* at 45723–24 (holding that the CAT will allow regulators to accurately track all activity in NMS securities). The trade that precipitated the Flash Crash was of an NMS security and, therefore, the CAT would contain data of the trade. *See Investor Bulletin*, *supra* note 94 (explaining that ETFs are NMS securities).

202. *Id.* at 45723–24.

A. *Need and Objectives of the CAT to Achieve the Goals of the NMS*

In order to achieve the congressional goals<sup>203</sup> of the NMS, the SEC and SROs need the ability to detect occurrences that threaten market integrity and efficiency.<sup>204</sup> The recent advances in technology, and HFT comprising a majority of securities trades left the SEC and the exchanges in a challenging regulatory situation.<sup>205</sup> The NMS plan via the CAT seeks to accomplish the goals of the NMS in the ever-advancing technological world.<sup>206</sup>

The CAT improves market surveillance and investigations by first and foremost expanding the amount of data accessible to regulators by housing all trading data in the CAT repository and reducing the length of time necessary to retrieve the data.<sup>207</sup> Currently regulators must request data from the broker-dealer, determine what format and definitions of the data the broker-dealer uses, and then analyze the data to determine if there is risk.<sup>208</sup> Because the CAT utilizes a repository, instantly accessible to regulators, that will contain all NMS security order data, regulators no longer need to contact broker-dealers to receive order data.<sup>209</sup> Furthermore, the NMS plan placing restraints on data format leads to quicker, more efficient, and more precise risk analysis.<sup>210</sup>

On the other hand, the final rule contains a prohibition on the NMS plan from “mandating reporting audit trail data prior to 8:00 a.m. the next trading day.”<sup>211</sup> The proposed rule, however, required an iteration of the CAT encompassing real time data.<sup>212</sup> Disregarding the economic feasibility of real time data, the comment phase of the proposal suggested ways to produce a timelier and more accurate CAT

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203. See *supra* Part I.

204. Consolidated Audit Trail, 77 Fed. Reg. 45722, 45727 (Aug. 1, 2012) (codified at 17 C.F.R. pt. 242).

205. Consolidated Audit Trail, 75 Fed. Reg. at 45722.

206. *Id.*

207. *Id.* at 45723-24.

208. *Id.*

209. *Id.* at 45724.

210. See *id.*

211. See Elisse B. Walter, *The Final Rules for Consolidated Audit Trail*, HARV. L. SCH. F. ON CORP. GOVERNANCE & FIN. REG. (July 27, 2012, 9:12 AM), <http://blogs.law.harvard.edu/corpgov/2012/07/27/the-final-rules-for-consolidated-audit-trail/>

212. Vilczek, *supra* note 29.

rather than waiting until 8:00 a.m. the next day.<sup>213</sup> Nevertheless, the final rule precludes the SROs and FINRA from exploring this option.<sup>214</sup> The CAT also improves market surveillance by requiring each account holder to have a unique ID.<sup>215</sup> Without the CAT, determining who made a trade and at what time is a cumbersome process for the SEC.<sup>216</sup> Current SRO audit trail data only identifies the “dates and times of trades by a particular broker-dealer,” not the identities of the customers who used the broker-dealer and executed the actual trades.<sup>217</sup>

In order for regulators to identify the actual customers, the regulators must receive Electronic Blue Sheet<sup>218</sup> (“EBS”) data and compare it to a SRO’s currently existing audit trail data, such as data compiled by FINRA through OATS.<sup>219</sup> To identify the time the actual trade originated requires the regulators to obtain a third and separate set of data.<sup>220</sup> The third set of data becomes convoluted if single customers use many different brokers, potentially taking months to resolve.<sup>221</sup> Regulators, therefore, often bypass determining important details of the order to the detriment of policing schemes that cause extreme market volatility.<sup>222</sup>

Some critics, however, opine that Rule 613 developed trader identification standards to lax to achieve the requisite oversight to control market volatility and police the markets.<sup>223</sup> For instance, the original proposal required unique customer identifiers, whereas the final rule only requires the identification of the account holder.<sup>224</sup> In some cases, the account holder ID only shows the entity on the account, instead of the individuals making the trades.<sup>225</sup> The adopted iteration of

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213. *Id.*

214. *Id.*

215. Consolidated Audit Trail, 77 Fed. Reg. 45722, 45772 (Aug. 1, 2012) (codified at 17 C.F.R. pt. 242).

216. *Id.*

217. *Id.* at 45731.

218. “EBSs are trading records requested by the Commission and SROs from broker-dealers that are used in regulatory investigations to identify buyers and sellers of specific securities.” *Id.* at 45722.

219. *Id.* at 45726–28.

220. *Id.* at 45730.

221. *Id.*

222. *Id.*

223. *See* Walter, *supra* note 211.

224. *See id.*

225. *Id.*

the CAT limits its ability to prevent future flash crashes by not requiring real time reporting and unique customer IDs.

*B. Conflicts in the NMS Plan*

The SEC pushed back the deadline to submit the NMS Plan to September 30, 2014,<sup>226</sup> well over a year from the original deadline.<sup>227</sup> The SROs and FINRA pushed for extensions because of the required “significant work and analysis.”<sup>228</sup> Further, members of the industry also campaigned on behalf of the SROs for an extension.<sup>229</sup> The industry members’ reasoning centers around data security concern and the plan requiring a brand new reporting system, instead of updating an existing audit trail like OATS.<sup>230</sup>

The SEC tasking the SROs (along with FINRA) with choosing the developer of the CAT and designing the implementation of the CAT could also lead to a delay.<sup>231</sup> Because Rule 613 forces the SROs to fund the running and implementation of the CAT,<sup>232</sup> delaying the CAT would save SROs money in the short term. The SROs, however, have the ability to pass the costs of implementing the CAT on to broker-dealers.<sup>233</sup> The SROs met the September 30, 2014, deadline for submitting the NMS plan,<sup>234</sup> yet the SROs still have not selected a bidder to develop and implement the CAT.<sup>235</sup> Additionally, financial experts estimate that the implementation process of the CAT, once a

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226. CAT NMS PLAN, SUMMARY OF THE CONSOLIDATED AUDIT TRAIL INITIATIVE 10 (Aug. 6, 2014), available at <http://catnmsplan.com/web/groups/catnms/@catnms/documents/appsupportdocs/p571933.pdf>.

227. The Rule required the joint plan to be submitted 270 days from the publishing of the rule in the Federal Register in August 2012. Press Release, U.S. Sec. & Exch. Comm’n, *supra* note 190.

228. Nina Mehta, *supra* note 191.

229. Comment Letter from Andrew Small, General Counsel, Scottrade Inc., to U.S. Sec. & Exch. Comm’n (Aug. 9, 2010), available at <http://www.sec.gov/comments/s7-11-10/s71110-43.pdf>.

230. *Id.*

231. Dennis Kelleher, president of Better Markets, stated “It’s not exactly in their (SROs) interest to be quick about this.” Brush & Phillips, *supra* note 18.

232. Joint NMS Plan Letter, *supra* note 32.

233. *Id.*

234. See Joint NMS Plan Letter, *supra* note 32, at 1 (explaining that the SROs were required to file a joint NMS plan).

235. Herbert Lash, *Bidders for U.S. Market Surveillance System Make Presentations*, REUTERS (May 13, 2014), <http://www.reuters.com/article/2014/05/13/sec-cat-shortlist-idUSL1N0NZ2BU20140513>.



bidder is accepted, will take three years.<sup>236</sup> Because of the two delays and the final bidder to develop the CAT not being selected (it has been narrowed to six bidders),<sup>237</sup> 2018 would be the CAT's earliest operational timeframe.<sup>238</sup>

An additional complication is the inherent conflict of interest between FINRA and the implementation of the CAT.<sup>239</sup> Rule 613 dictates that FINRA and the SROs must select the bidder to implement the CAT plan, yet FINRA also submitted a bid.<sup>240</sup> FINRA, however, maintains it created a wall between the employees who are helping select the bidder and the employees working on FINRA's individual bid.<sup>241</sup> FINRA operating OATS also creates a conflict because the CAT most likely renders OATS useless.<sup>242</sup> Additionally, some commentators believe FINRA could lose the power and sway it holds over market data if FINRA lost the bid.<sup>243</sup> FINRA refutes this argument, insisting that its survival in no way depends on winning the CAT contract.<sup>244</sup> Conflict or not, members of the industry opined that using a variation of OATS provides the most efficient and effective manner to implement the CAT.<sup>245</sup>

## VI. COSTS OF THE CAT

Industry sentiment during the comment phase of Rule 613 suggested two underlying issues: (1) privacy concerning the data the CAT collects in the repository, and (2) financial costs of implementing the CAT.<sup>246</sup> The privacy concerns center around the sheer volume of data the CAT will possess, specifically identification of the account

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236. *CAT Cost Estimates Vary, Sit Well Below 2010 Figure*, *supra* note 28.

237. Lash, *supra* note 235.

238. Brush & Phillips, *supra* note 18.

239. Lash, *supra* note 235.

240. *Id.*

241. Brush & Phillips, *supra* note 18.

242. *Id.*

243. *See id.*

244. *Id.* (statement of Tom Gira, Executive Vice President for Market Regulation) ("[FINRA] would be disappointed [if they lost the bid], but [it would not be] the end of the world." ).

245. *See* Comment Letter from Howard Meyerson, General Counsel, and Vlad Khandros, Market Structure and Public Policy Analyst, Liquidnet, New York, to U.S. Sec. & Exch. Comm'n 1 (July 19, 2010), *available at* <http://www.sec.gov/comments/s7-11-10/s71110-19.pdf>.

246. *See* Small, *supra* note 229, at 2; Meyerson & Khandros, *supra* note 245, at 4.

holder making the trade.<sup>247</sup> In some instances personally identifiable information, such as social security numbers or tax ID numbers, identify the account holder.<sup>248</sup> While the number of account holders is not conclusively known, account holder IDs could number over 100 million.<sup>249</sup> The adopted version of Rule 613 eased some cost concerns because it does not require real time (same day) reporting or unique customer identification.<sup>250</sup> Nevertheless, the SROs' implementation costs and broker-dealers' costs to adhere to Rule 613 are immense.<sup>251</sup>

A. *Privacy Concerns*

Rule 613 requires the CAT repository to house extraordinary amounts of data concerning traders.<sup>252</sup> The CAT repository also inherently contains confidential data, such as market participants' trading strategies and, therefore, security of the data is important.<sup>253</sup> While it may be difficult to place a monetary value on this information, institutions fear misuse of the data or adverse entities acquiring the sensitive data.<sup>254</sup> The benefits of the CAT could be outweighed if Rule 613 does not effectively regulate the privacy of the reported data.

For example, on January 2, 2015, the NYSE Group—a combination of NYSE and NYSE Arca—jointly recorded 3.9 million trades, the lowest number of trades recorded in 2015.<sup>255</sup> Using 3.9 million as the average daily volume, extrapolated for the entire year, results in a yearly trade volume equaling 975 million.<sup>256</sup> Each trade

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247. Consolidated Audit Trail, 77 Fed. Reg. 45722, 45756 n.357 (Aug. 1, 2012) (codified at 17 C.F.R. pt. 242).

248. *Id.*

249. *See id.* The commenter suggested that the number of unique customer IDs could be in the billions. *Id.* However, because the adopted version of Rule 613 only requires account holder IDs this figure would be less than unique customer IDs. Walter, *supra* note 210. Conservatively estimating that account holder IDs represent only 10% of customer IDs would still allow the number of account holder IDs to be over 100 million. *Id.*

250. *See* Consolidated Audit Trail, 77 Fed. Reg. at 45766.

251. *CAT Cost Estimates Vary, Sit Well Below 2010 Figure*, *supra* note 28.

252. *See* Consolidated Audit Trail, 77 Fed. Reg. at 45766 (providing FINRA provides 40 billion data validations itself through its OATS data).

253. *Id.* at 45782.

254. *See* Small, *supra* note 229.

255. *Daily NYSE Group Volume in NYSE Listed, 2014*, NYXDATA.COM, [http://www.nyxdata.com/nyxdata/asp/factbook/viewer\\_edition.asp?mode=table&key=3141&category=3](http://www.nyxdata.com/nyxdata/asp/factbook/viewer_edition.asp?mode=table&key=3141&category=3) (last updated Jan. 30th, 2015).

256. The NYSE is open five days a week, fifty-two weeks a year. *Holiday and Trading*

necessitates a buyer and seller purchasing and selling a security at a price, and Rule 613 dictates both that both require a unique account holder ID.<sup>257</sup> The CAT repository contains the unique account holder ID for the entities who made the trade, the date of the trade, what security was traded, and the price of the trade.<sup>258</sup> The 975 million trades that this hypothetical exhibits, however, highlight the amount of trades from only two of the eighteen<sup>259</sup> national securities exchanges.

Rule 613 also stipulates that the CAT must track every order and quote made on a NMS security, regardless of whether the order is executed.<sup>260</sup> While every trade must have an accompanying order, some orders go unexecuted, thereby increasing the amount of data the CAT is required to house.<sup>261</sup> Furthermore, the CEO from Boston Options Exchange stated they received “millions of quotes per day.”<sup>262</sup> In sum, the amount of data the CAT will collect could be ten terabytes *each day*.<sup>263</sup> The ten terabytes of data include countless trading strategies of many sophisticated investors.<sup>264</sup> In order for Rule 613 to be justifiable, the CAT must effectively secure the data it contains.<sup>265</sup>

Rule 613 addresses privacy concerns by mandating the NMS Plan to adhere to certain standards.<sup>266</sup> Specifically, Rule 613 requires “[a]ll plan sponsors and their employees, as well as all employees of the central repository, [to] agree to use appropriate safeguards to ensure the confidentiality of such data and [to] agree not to use such data for any

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*Hours*, NYSE, <https://www.nyse.com/markets/hours-calendars> (last visited Feb. 6, 2015). Based on the market calendar and the average daily trading volume, there are approximately 975 million trades per year. *See id.*

257. *See* Consolidated Audit Trail, 77 Fed. Reg. at 45740 n.187 (observing that the unique customer ID is necessary for an efficient CAT).

258. *Id.* at 45723.

259. *Id.*

260. *Fact Sheet*, *supra* note 23.

261. *See Limit Orders*, U.S. SEC. & EXCH. COMM’N, <http://www.sec.gov/answers/limit.htm> (last visited Jan 7, 2015) (explaining that limit orders are not necessarily executed).

262. Comment Letter from Anthony D. McCormick, CEO Boston Options Exch., to U.S. Sec. & Exch. Comm’n 3 (Aug. 9, 2010), *available at* <http://www.sec.gov/comments/s7-11-10/s71110-38.pdf>.

263. Comment Letter from Richard A. Ross, Founder, High Speed Analytics, to U.S. Sec. & Exch. Comm’n (Feb. 9, 2011), *available at* <http://www.sec.gov/comments/s7-11-10/s71110-86.htm>.

264. Consolidated Audit Trail, 77 Fed. Reg. at 45782.

265. *See* Meyers & Khandros, *supra* note 244.

266. Consolidated Audit Trail, 77 Fed. Reg. at 45782.

purpose other than surveillance and regulatory purposes.”<sup>267</sup> In addition to general language requiring the plan sponsor to adhere to certain data confidentiality standards, Rule 613 contains specific ways the plan sponsors must protect data.<sup>268</sup> For example, Rule 613 requires the NMS Plan sponsors adopt rules that “(1) require information barriers between regulatory staff and non-regulatory staff with regard to access and use of data in the central repository, and (2) permit only persons designated by plan sponsors to have access to the data in the central repository.”<sup>269</sup> Rule 613 prevents confidential information from being “communicated to any personnel at an SRO that are engaged in non-regulatory or business activities.”<sup>270</sup> Some industry members feared that third parties, including academia and individuals with fiduciary responsibility to shareholders, would be granted access to the CAT data.<sup>271</sup> Conversely, other commentators maintain the benefits of granting third-party access, such as third-party analysis, contributing to the effectiveness of the SEC.<sup>272</sup> The SEC, citing privacy concerns, however, refused to grant third party access to CAT data.<sup>273</sup> In sum, the SEC understands the importance of confidentiality and included safeguards to inhibit leakage of confidential information in the framework of Rule 613.<sup>274</sup>

*B. Financial Costs for Both SROs and Broker-Dealers  
Necessitated by the NMS Plan*

As required by Rule 613, the eighteen SROs and FINRA submitted an NMS plan with detailed estimation of costs for both broker-dealers and the SROs.<sup>275</sup> The SROs and FINRA developed the estimation via cost-related comments to the Rule 613 proposal, information provided by the six short listed bidders, and surveys distributed to broker dealers.<sup>276</sup> The six short listed bidders provided

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267. *Id.* at 45782.

268. *Id.*

269. *Id.*

270. *Id.*

271. *See id.*

272. *See id.*

273. *Id.*

274. *Id.*

275. Joint NMS Plan Letter, *supra* note 32, at app. (C)(44).

276. *Id.*

one-year cost estimates along with annual recurring costs.<sup>277</sup>

### 1. Broker-Dealer Costs to Adhere to Rule 613

Approximately 50% of the 4,000 broker-dealers adhere to audit trail reporting obligations.<sup>278</sup> Only 167 broker dealers responded to the survey, however, and only fifty-seven<sup>279</sup> dealer-brokers disclosed current reporting costs.<sup>280</sup> Of the fifty-seven broker dealers, average annual change in implementation and maintenance costs to comply with CAT standards averaged approximately \$346,000 for the twenty-four large broker-dealers (broker dealers possessing more than \$500,000 in capital on a certain audit date) and \$435,000 for thirty-three small broker-dealers.<sup>281</sup> For broker-dealers without current reporting costs, cost estimations ranged between \$0 and \$20 million for one time implementation costs, and between \$50,000 and \$6 million for annual maintenance costs.<sup>282</sup> In addition to reporting costs, one time hardware and software costs to broker-dealers for implementation of the CAT ranged from \$13,200 to \$5 million.<sup>283</sup> Also, estimates for future surveillance hardware and software costs ranged from \$125,000 to \$17 million per year.<sup>284</sup>

Broker-dealers costs, however, are somewhat misleading because the NMS plan detailed that some, if not most, of the costs will be passed on to investors.<sup>285</sup> Regardless, even assuming the highest averages for the 4,000 large and small broker-dealers, the total expenditures do not near the \$1 trillion value loss at the height of the Flash Crash.<sup>286</sup> Additionally, the costs associated with each broker-dealer is nominal relative to the SRO's estimated costs.

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277. *Id.*

278. *Id.* at app. (C)(44).

279. The fifty-seven used to estimate costs included fifty-one OATS reporters and six other broker-dealers that report to a different system that reported positive current reporting costs. *Id.* at app. (C)(54).

280. *Id.* at app. (C)(49).

281. *Id.* at app. (C)(54–55).

282. *Id.* at app. (C)(55).

283. *Id.* at app. (C)(56).

284. *Id.*

285. *Id.* at app. (C)(52).

286. Assuming the highest estimation of costs, a combined \$28,000,000 in cost, multiplied by 4,000 broker-dealers, plus \$20,000,000, would equal \$112,000,000,000. *See id.*

## 2. Costs to SROs for Implementing and Maintaining a CAT

The six shortlisted bidders provided an estimated total cost of ownership to build, operate, and maintain the CAT.<sup>287</sup> Each bidder anticipates that the actual cost estimates to build and maintain the CAT differ from the initial estimates.<sup>288</sup> The bidders estimated “total one-time cost to build the CAT, including technology, operational, administration, and any other material costs” ranging from \$30 million to \$91 million with an average of \$59 million.<sup>289</sup> Additionally, the bidders provided five-year annual recurring cost estimates following the selection of the winning bidder and an estimate of annual peak-year costs.<sup>290</sup> The estimates for total five-year cost, for the first five years of operation, approximately ranged from \$130 million to \$465 million with an average five year cost of \$225 million and an average annual cost of \$50 million.<sup>291</sup> Peak-year cost estimates approximately ranged from \$27 million to \$110 million with an average of \$60 million.<sup>292</sup>

The bidders estimated costs are much lower than the SEC estimated \$4 billion one- time cost and \$2 billion annual recurring cost when it first proposed Rule 613.<sup>293</sup> The substantially lower cost, however, could be a by-product of Rule 613 not requiring real-time reporting or unique customer IDs.<sup>294</sup> Some industry members have suggested that not requiring real-time reporting or unique customer IDs will be to the detriment of the effectiveness of the CAT.<sup>295</sup> While Rule 613 solved privacy concerns and the NMS plan detailed relatively reasonable cost estimations, the CAT in its current iteration is not effective or necessary.

## VII. CONCLUSION

Five years later, the Flash Crash burns bright in investor’s

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287. *Id.* at app. (C)(54).

288. *Id.*

289. *Id.*

290. *Id.*

291. *Id.*

292. *Id.*

293. *CAT Cost Estimates Vary, Sit Well Below 2010 Figure*, *supra* note 28.

294. *See Consolidated Audit Trail*, 77 Fed. Reg. 45722, 45766 (August 1, 2012) (codified at 17 C.F.R. pt. 242).

295. *Walter*, *supra* note 211.

minds.<sup>296</sup> When almost a \$1 trillion in market value dissipates in minutes, action will be taken.<sup>297</sup> As HFT continues to dominate the market, regulators must develop effective regulatory methods.<sup>298</sup> Rule 613 seeks to regulate the entire market landscape in order to prevent extreme market volatility and increase transparency by having more effective market surveillance.<sup>299</sup> While the CAT helps to achieve these goals, it leaves much on the table by not requiring real-time reporting or unique customer IDs.<sup>300</sup> On the other hand, from a privacy standpoint Rule 613 took ample precaution in preventing misappropriation of sensitive data.<sup>301</sup> Furthermore, from a cost standpoint the CAT is substantially less expensive than anticipated.<sup>302</sup>

Regardless, prior regulations limit the need for the CAT. For example, the large trader reporting rule receives much of the same information the CAT receives in the same time frame.<sup>303</sup> Additionally, the limit up-limit down mechanism and market wide circuit breakers would have halted much of the trading during the Flash Crash.<sup>304</sup> Combined, the regulations enacted prior to Rule 613 substantially limit the possibility of another flash crash.<sup>305</sup> In its current iteration, the CAT is an overreaction to the danger of flash crashes.

HAYDEN C. HOLLIMAN

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296. See Brush & Phillips, *supra* note 18.

297. Lin, *supra* note 1, at 704 (describing the trillion dollar market value lost).

298. Consolidated Audit Trail, 75 Fed. Reg. 32556, 32563–64 (proposed June 8, 2010) (to be codified at 17 C.F.R. pt. 242).

299. Consolidated Audit Trail, 77 Fed. Reg. at 45723–24.

300. Walter, *supra* note 211.

301. See Consolidated Audit Trail, 77 Fed. Reg. at 45781.

302. *CAT Cost Estimates Vary, Sit Well Below 2010 Figure*, *supra* note 28.

303. See *supra* Part IV.D.

304. Alpert and Stryjewski, *supra* note 173.

305. See *supra* Part IV.E.